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water. (4) Artificially prepared humus neither affected the N-fixation favorably, nor could the bacteria use it as a source of food. (5) The N-fixing power of supplies of *Azotobacter* derived from pure cultures and grown in identical conditions was extraordinarily different at optimal temperatures as well as at low and higher points. Some light may be cast on this by the following.

In an elaborate examination of the behavior of *Azotobacter*¹¹ THIELE believes that he has established incontestably that this organism is capable of accumulating N in the laboratory; but he is quite uncertain whether this power belongs specifically to it, as for example alcohol production does to yeast. It is not impossible that N-starvation in the artificial culture or the stimulation by abundance of organic matter awakens an inherent capacity of *Azotobacter* to fix N, which ordinarily slumbers. The growth of *Azotobacter* in artificial cultures is neither decisive nor typical. Its mode of action in the soil is still entirely unknown and is likely to remain so, in spite of theories, until there have been devised more exact methods of investigating the extremely minute variations of the N in soils. In view of all this uncertainty, THIELE deprecates giving agriculturists any advice which would lead them to attempt to replace Chili saltpeter by a bacterial "fertilizer."—C. R. B.

Burbank's work.—An interesting and illuminating account of the breeding experiments of LUTHER BURBANK is contributed by DEVRIES to the *Biologisches Centralblatt*.¹² It is the first statement we have seen addressed to scientific men by a man competent to appreciate both the practical and scientific aspects of BURBANK's work.—C. R. B.

Anti-enzyme.—With the aid of BERTEL, CZAPEK¹³ has now elaborated the results of ten years of research devoted to developing a chemical test for tropistic sensation. Until 1897, when the author published his initial paper of this investigation, we had no way of knowing that an organ had perceived a stimulus unless it manifested response in the form of a motor reaction. In fact it was assumed that perception had not occurred unless such a motor reaction followed. FITTING, in his work on tendrils, was able by indirect methods to show that an organ may perceive a stimulus and still be incapable of executing a motor reaction. In animal irritability it has long been believed that sensations involve alterations in the metabolism of the organ. To CZAPEK belongs the honor of a fruitful pioneer research. Root tips contain tyrosin, an unstable derivative of proteids, continually yielding oxidation derivatives. The most prominent of the latter is homogentisinic acid. This research has shown that this acid is present in unstim-

¹¹ THIELE, R., Die Verarbeitung des atmosphärischen Stickstoffs durch Mikroorganismen. Landw. Versuchs-Stat. **63**:161-238. 1906.

¹² DE VRIES, HUGO, Die Neuzüchtungen Luther Burbank's. Biol. Centralb. **26**:609-621. 1906.

¹³ CZAPEK, FRIEDRICH, unter Mitwirkung von RUDOLPH BERTEL, Oxydative Stoffwechselvorgänge bei pflanzlichen Reizreaktionen. (Zwei Abhandlungen.) Jahrb. Wiss. Bot. **43**:361-467. 1906.